



UNIVERSITÀ DEGLI STUDI DI MILANO

INTERNATIONAL CLINICAL NEUROMUSCULAR FELLOWSHIP PROGRAM

PHARMACOLOGICAL AND NON-PHARMACOLOGICAL TREATMENTS IN
NEUROMUSCULAR DISORDERS: IMPLEMENTING STANDARDS OF CARE

Program Director: Valeria A Sansone



NEUROMUSCULAR FELLOW PROGRAM

1. Introduction

The NEMO Center is a dedicated clinical center for patients and families with neuromuscular disorders. It was conceived and structured *by patients for patients* in 2008. NEMO stands for NEuroMuscular Omniservice reflecting the fact that it is a neuromuscular clinical center with multidisciplinary dedicated care. The initiative derives from the joined action of the Italian Muscular Dystrophy Association, the Italian Spinal Muscular Atrophy (SMA) Association, the Italian Amyotrophic Lateral Sclerosis Association, Fondazione Telethon and the National Health System, which allowed the creation of the NEMO model, where public and private funding coexist for a common goal, the care of neuromuscular patients.

Too often, patients with neuromuscular disorders have to travel from one specialist to another to address issues directly or indirectly related to their muscle condition. The NEMO Centers guarantee that there is a single point-of-care for these patients and that care takes place on a patient-centered basis: care and highly specialized consultation occur at the NEMO Centers where a team of dedicated health-care providers are present as in-staff. More than 600 patients with NMD are admitted each year as in-patients and more than 2000 as out-patients.

There are 4 connected Centers in Italy, one in Milan (North of Italy), one in Liguria (North-West of Italy), one in Rome (Central Italy), and one in Sicily (South of Italy).

The NEMO Center in Milan has 20 in-patient beds, 4 day-hospital beds for out-patient services and out-patient clinics for neurology, rehabilitation, pulmonology, child neurology and clinical psychology.

Since 2013, the NEMO Center is a University teaching hospital where students, residents, fellows and post-docs apply for neuromuscular teaching programs.

Finally, the NEMO Center is also a Clinical Research Centers involved in national and international clinical trials in the pediatric and adult neuromuscular field and recognized amongst top recruiters in Europe. The NEMO Center has a long-lasting experience in outcome measures and compliance with international standards and training in pediatric and adult muscle disorders and is leading nationwide networks on different disorders (nationwide catchment area).

2. Goals and Objectives for Training

This Fellowship program provides training in 2 major areas:

- *Multidisciplinary and multiprofessional clinical evaluation and therapy* of neuromuscular diseases in both kids and adults in the in- and out-patient setting. The NEMO Clinical Center is ideally suited for this purpose, given the large volume of neuromuscular patients seen by established neuromuscular physicians and investigators who have a clear track record of the quality of clinical care in the clinical and academic field. There is also a good opportunity to learn about extramuscular diagnosis and management, including the acute spectrum of respiratory and swallowing problems in neuromuscular disorders involving both kids and adults. There is a busy out-patient service that provides exposure to the evaluations and treatment in a broad range of neuromuscular patients and especially Amyotrophic Lateral Sclerosis (ALS), Spinal Muscular Atrophy (SMA), Duchenne and Becker Muscular Dystrophies (DMD/BMD), Myotonic Dystrophies (DM1 and DM2),



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Facioscapulohumeral Muscular Dystrophy (FSHD), mitochondrial disorders, skeletal muscle channelopathies, congenital muscular dystrophies (CMD). The NEMO Center, being one of 5 Centers in Italy treating SMA1 patients with intrathecal Nusinersen, offers the opportunity to learn about assessment and treatment options with the most recent therapeutical drugs available worldwide.

- *Mentorship and step-by-step guidance in the performance of a clinical research project in neuromuscular disease.* This is an important component of the fellowship. The program offers training in the design of a clinical trial, including basic research aspects to this because of ongoing collaborations with clinical genetic departments, muscle biopsy and neurophysiology labs and cell biology units in collaboration with Niguarda Hospital and the University of Milan facilities. There is a wide range of basic and clinical neuromuscular research in progress at the Nemo Center. The fellows are mentored by one of the neuromuscular physicians at the Center and supervised in generating research hypothesis, and in developing approaches for methodology, data collection, data analysis, and writing of scientific reports. Nearly all trainees so far have presented their results at national and international meetings and there is an active publication rate in peer-reviewed journals from the Nemo Center.

Educational Objectives for Neuromuscular Disease Fellowship:

- Learn the anatomy and physiology of motor neuron, peripheral nerve, neuromuscular junction and skeletal muscle, including ion channels.
- Learn the pathophysiology of the various neuromuscular diseases
- Learn the major and minor signs and symptoms of the various neuromuscular diseases
- Learn to obtain a comprehensive neuromuscular medical history, to draw a complete family tree and to perform a complete neuromuscular examination including manual muscle strength assessment
- Learn the strategy to confirm the clinical diagnosis of the various neuromuscular diseases using the various tools available: electrophysiology, biopsy, routine laboratory and genetic testing, muscle MRI
- Learn the strategy to confirm the clinical diagnosis of extramuscular involvement using the various tools from the different professional and disciplines available: respiratory function tests, nocturnal polygraphy, capnography, psychological strategies to approach end-of-life decisions
- Learn the strategy to confirm the need for specialized rehabilitation support with advanced technologies such as augmentative alternative communication aids, remote monitoring of clinical care and use of highly technological devices
- Learn the major and minor histopathologic features of the various neuromuscular diseases
- Learn the characteristics of electrodiagnostic signatures of the various neuromuscular diseases
- Learn the clinical spectrum and natural history of the various neuromuscular diseases
- Learn the standard, innovative and investigational therapies for the different neuromuscular conditions including pharmacological and non-pharmacological interventions (eg ventilation, secretion management, gastrostomy)



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- Learn to conduct a clinical research project under the mentorship and direction of the Program Director, one of the neuromuscular PIs, Clinical Coordinators and Research Nurses

In addition there is:

- the opportunity to rotate at one or more of the other NEMO Centers as part of the educational program under the supervision of the Program Director and local University Directors or Neuromuscular Hospital Referrals
- the opportunity to participate in an ongoing research trial under the supervision of the Program Director and PI of the study as well as with the support of the Clinical Coordinators, Clinical Evaluators and Research Nurses
- the opportunity to learn to write grants to obtain external funding for future research

3. Teaching Staff

Valeria A Sansone, MD: Program Director

Dr Sansone is the Program Director for the fellowship program. Dr Sansone personally oversees and organizes the activities of the educational program including supervising program personnel- She is also responsible for selecting the prospective fellows. She works with the fellows when they are staffed in the out-patient neuromuscular clinic, in specific clinical research protocols where she is the PI, in the expanded access program with Nusinersen for SMA1 patients.

Christian Lunetta, MD

Dr Lunetta is the referral for ALS at the NEMO Clinical Center. Dr Lunetta works with the fellows when they are staffed in the ALS clinic as in- and out-patients, in ALS ongoing research protocols and teaches how to diagnose, manage and treat patients with ALS, including technology skills with remote monitoring and high-technological devices. He will also provide mentoring on how to write research grants to obtain funding for research.

Alice Zanolini, MD

Dr Zanolini is the referral for adult muscular dystrophies at the NEMO Clinical Center. She works with the fellows when they are staffed in the clinic as in- and out-patients, in ongoing research protocols and teaches



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how to diagnose, manage and treat patients with Myotonic Dystrophies, FSHD and mitochondrial myopathies.

Caterina Conti, MD

Dr Conti, is a pulmonologist, part of the respiratory team at the NEMO Clinical Center. She works with the fellows when they are staffed in the clinic as in- and out-patients, in ongoing research protocols and teaches how to diagnose, manage and treat patients with neuromuscular disorders having respiratory problems.

Emilio Albamonte, MD

Dr Albamonte is a child neurologist. He works with fellows when they are staffed in the clinic as in- and out-patients, in ongoing research protocols and teaches how to diagnose, manage and treat kinds from 0-18 with neuromuscular disorders and especially SMA, DMD, congenital muscular dystrophies and congenital myotonic dystrophies.

Daniela Ginocchio, MD

Dr Ginocchio is a ear-nose-throat doctor, specialized in swallowing function in neuromuscular patients. She teaches fellows about fibroscopy, swallowing strategies and nutritional aspects in neuromuscular disorders.

Elena Carraro, MD

Dr Carraro is rehabilitation doctor, specialized in neuromuscular disorders. She teaches fellows about exercise programs, rehabilitation concepts including communication, upper limb function, and education programs to provide strategies towards independence. Dr Carraro supervises the rehab compartment and provides support and connections between fellows and the PTs.

Marino Iatomasi, PT

Marino Iatomasi has a specific training in respiratory physiotherapy. Under the consultation of dr Rao, the referral Pulmonologist at the Nemo Center, and the respiratory team, he teaches about respiratory function involvement, diagnosis and management in patients with neuromuscular disorders having respiratory problems

Elisa De Mattia, PT

Elisa De Mattia, is the referral for physiotherapists and has a specific training in respiratory physiotherapy. She coordinates care among the different therapists and teaches fellows about multidisciplinary rehabilitation pathways of care. She also provides mentoring on research projects.

Giordana Don Vito, PT

Giordana Don Vito, with the contribution of the occupational therapy service teaches fellows when, which and how to order appropriate assistive devices

Valentina Gatti, PT



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Valentina Gatti, with the contribution of the physiotherapy service teaches fellows to perform standard motor function tests used in clinical and research practice.

Valentina Morettini, PT

Valentina Morettini, is a child therapist. She teaches fellows about tests and procedures to be performed on kids in clinical and research practice.

Anna Marconi

Anna Marconi is a clinical psychologist and psychoterapist, specialized in neuromuscular disorders and especially ALS. The fellows are taught about the approach to the diagnosis, follow-up, genetic consultation, and end-of life decisions as well as about specific tests to be done to determine quality of life perception, disability perception and coping.

Jacopo Casiraghi

Jacopo Casiraghi is a clinical psychologist and family psychotherapist, specialized in neuromuscular disorders, and especially SMA. The fellows are taught about the approach to the diagnosis, about how these diseases affect the whole family and how important it is to consider siblings in these affected families. Fellows will learn about specific approaches to deal with these issues.

Lucia Greco

Lucia Greco is a clinical psychologist with training in neuropsychology. She will teach fellows about neuropsychology tests and pathways of care. She will also provide mentoring on how to write a scientific publication on peer-reviewed journals.

Elena Gotti

Elena Gotti is the Nurse Coach at the Nemo Clinical Center and coordinates care among the different disciplines and between the Center and the out-patient facilities and Primary Care doctors. She teaches fellows about coaching for patients and caregivers and teaches them about the holistic approach to care.

Paola Nova

Paola Nova is a Nurse, who has specialized in Neuromuscular Care and wound care. She teaches fellows about the practical issues with aspiration, nutrition, wound care, mobilization and treatment issues with patients with neuromuscular disorders.

Luca Mauro

Luca Mauro is a nurse who has specialized as a Clinical Coordinator and Clinical Research Associate. He teaches fellows about a clinical trial, and how to coordinate the steps and timeline. He also teaches fellows about the significance and importance of complying with the standard operating procedures, and about IRB and other regulatory requirements. He also provides mentoring and support in designing a research protocol.



External collaborations

Fellows will have the opportunity to be staffed with Faculty at the University of Milan, with whom the Clinical Center has ongoing collaborations.

4. Facilities

Fellows will have access to:

- Neurology/Child Neurology, Pulmonology, Rehabilitation and Clinical Psychology Units at the Nemo Center
- The FEES Lab for swallowing studies at the Nemo Center
- The Respiratory Function Test Lab at the Nemo Center
- The Clinical Research Center at the Nemo Center to follow clinical research projects
- The out-patient clinics for Neurology, Pulmonology, Rehabilitation and Clinical Psychology at the Nemo Center
- The Neurophysiology Lab at the NEMO Center and within Niguarda Hospital
- The Clinical Genetic Unit at Niguarda Hospital

5. Neuromuscular Fellowship Rotation Schedule

The schedule for fellows is individualized according to the specific goals and interests

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|--------------------------------|----------------|
| - Neuromuscular wards | 1-2 days/week |
| - Muscle Clinic | ½ - 1 day/week |
| - FEES Lab | ½ day/week |
| - Respiratory Lab | ½-1 day/week |
| - The Clinical Research Center | 1-2 days/week |

Rotation in external labs and at the other NEMO Centers is planned according to specific protocols and interests.

6. Educational Program

- **Clinical Component**

Fellows will acquire clinical skills in neuromuscular disorders:

- By supervised contact with patients
- By direct reading of various textbooks of Neuromuscular Diseases and relevant journal articles



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- By various conferences including: weekly Neuromuscular multidisciplinary clinics, weekly pediatric clinic, weekly respiratory clinic, weekly rehab clinic; monthly updates with Clinical Program Director

As part of the in- and outpatient clinic Fellows rotate in the clinic, and are responsible for evaluating 2-4 patients a day. Some patients are new and some are follow-up patients that the fellow has seen previously. The fellows present the patients to the assigned neuromuscular attending and obtain immediate feedback about the clinical data collected (es clinical history, neurologic examination, general clinical examination, their diagnostic hypothesis, planning of testing, and treatment plan. The attending physician has the responsibility to deliver high quality patient care and teach this to the fellow and also teach them how to closely monitor all aspects the patients encounter

- **Research Component**

Fellows are expected to conduct a clinical research project with one of the neuromuscular attendings functioning as their mentor. Fellows present their hypothesis, background, methods, and preliminary data at a monthly research meeting. As the data is collected, their mentors will meet with them and help them display the results graphically, develop statistical analysis for the data with the collaboration of the biostatistician, and help them work on writing a scientific report. It is expected that the fellow will present their work at national and international meetings and submit their work for peer reviewed publication.

- **Trainee's supervisory and patient care responsibilities**

The fellow has limited patient care responsibilities. Most of the daily care and monitoring of the patients that are seen by the fellow in the in-patient and out-patient clinic is handled by the referring physician, therapists and nurses. The fellows have the opportunity to identify patients they want to monitor closely and in this case the fellow becomes the first care provider regarding patient concerns, lab test results, referring physicians about management. Learning the approach to patient care and diagnosis is the major focus of the fellowship, less emphasis is being given to direct day-to-day responsibilities for the ongoing care of patients seen by the fellow.

- **Clinical Procedural Requirements**

The NEMO Clinical staff and Program Director closely supervises all phases the patients encounters with the fellow and the supervision includes the initial clinical examination, neurologic tests, planning of diagnostic tests, performance of the tests, patient discussion and diagnosis, prognosis and management, and the generating of reports or clinical notes to the referring physician.

- **Didactic Sessions and Teaching Methods**

- Neuromuscular Conferences bimonthly to discuss patients with challenging diagnostic or therapeutic issues. Patients are presented and then discussed in detail with the input from the staff, residents and students.
- Weekly Multidisciplinary Clinics: patients pathways of care are discussed to verify the diagnostic workup and clinical progression
- Monthly discussions with clinical trial monitors on ongoing research protocols to verify quality of clinical charts, reports, adverse events and any other challenge occurring during a clinical trial



- **Evaluation**

All trainees are directly supervised at all times by the faculty attending in any given day/rotation. Immediate feedback is given at the bedside and when discussing the case, diagnosis and plan of care. Formal milestones feedback is given every three months by the program director in a specific chart to monitor activities after reviewing all evaluations.

Trainees are evaluated on a formal basis every 3 months using an electronic computer platform (ARIEL) which is supervised by the Clinical Director and Faculty and includes training and testing.

A meeting is held every 6 months with the Program Director and core faculty evaluating the fellow based on the Neuromuscular Fellowship Milestones outlined by the University Fellowship Program. This includes that each core faculty member complete an evaluation on the fellow. University require that all faculty completes these evaluations. The fellows are also required to complete a fellowship survey.

Milano, 26 aprile 2017